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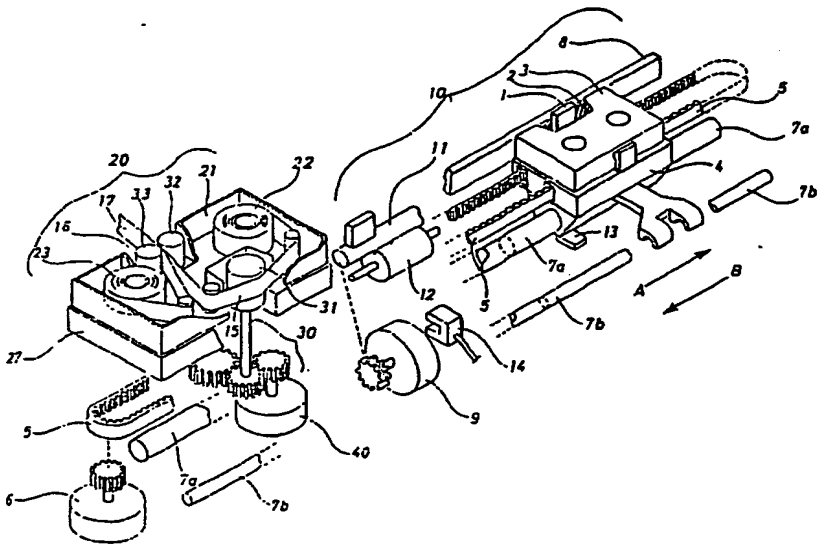
(54) Printing apparatus and printing tape cassette.

(57) Described are a printing apparatus and a printing tape cassette for use with this printing apparatus. The printing apparatus combines within one apparatus a first printing region (10) for the printing of ordinary paper and a second printing region (20) capable of preparing a lettering tape (17). By combining the two printing regions within one apparatus, several elements of the apparatus may be used in common, thus simplifying the overall structure of the apparatus and allowing a simplification and cost reduction of the control device. The two printing regions are disposed adjacent to each other, both within the shifting range of a carriage (4) mounting the printing head (1).



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The present invention relates to a printing apparatus that prints characters, symbols, etc. on a print medium, and in particular relates to a printing apparatus and a printing tape cassette capable of printing on ordinary paper and preparing lettering labels with a single machine.

Prior word processors employing a thermal transfer type printing apparatus that prints on single sheets of such as ordinary paper and tape printers that prepare lettering tapes existed as respectively separate machines.

They included printing through ink ribbons using thermal heads, and they had very many points in common such as printing complex kanji and handwritten characters with print elements of 48 dots or more.

However, inconveniences arose in that it was naturally impossible to print on ordinary paper with a tape printer, there was a need to cut the print medium to the required size after printing even when it was possible to prepare a lettering tape with a word processor, it was impossible to print on transparent tape because printing of mirror image characters cannot be done with word processors, and most of the print media had to be discarded after printing.

Also, since both word processors and lettering tape printers are expensive, it was very difficult to own both, with the result that the spreading of these electronic writing tools was held back.

The object of the present invention lies in offering a printing apparatus that removes the prior points of inconvenience described above and makes it possible to print on such as single sheets of ordinary paper and to prepare lettering tapes with a single printing apparatus, and to offer the most suitable printing tape cassette for this printing apparatus.

This object is achieved with a printing apparatus and a printing tape cassette as claimed, respectively.

Specific embodiments of the invention are subject matter of the dependent claims.

The present invention furnishes both an ordinary paper print region capable of printing on ordinary paper and a tape print region capable of printing on tape print media. The carriage mounting the printing head is provided so as to be shiftable over both of the said print regions. Completely different types of printing, that is printing on ordinary paper and preparation of lettering tape, are thus made possible with a single printing apparatus, and the printing apparatus has a very wide range of applications.

Embodiments of the invention will be explained below in detail in conjunction with the drawings, in which:

Fig. 1 is a schematic diagram showing the overall construction of a printing apparatus of the present invention,

Fig. 2 is a schematic diagram showing the construction of a printing tape transport mechanism of a printing apparatus of the present invention,

Fig. 3 is a schematic diagram in plan view of a printing tape cassette of the present invention,

Fig. 4 is a block diagram showing the overall construction of a word processor containing a drive control device of the printing apparatus of the present invention,

Fig. 5 is a schematic diagram showing the state of printing with the thermal head of the printing apparatus of the present invention,

Fig. 6 is a schematic diagram showing the construction and process of preparing a lettering tape,

Fig. 7 is a schematic diagram showing the state where the prepared lettering tape has been pasted onto an article,

Fig. 8 is an explanatory diagram showing the action of the carriage position setting and the position detection means,

Fig. 9 is a schematic diagram showing the overall construction of another example of the present invention,

Fig. 10 are plan views of the carriage interior of the other example of the present invention, with Fig. 10(a) showing the state where an ink ribbon winding mechanism of a ribbon transit mechanism is operating, and Fig. 10-(b) showing the state where a step motor is engaged with the head press/release mechanism,

Fig. 11 is an angular view of the carriage interior of the other example of the present invention,

Fig. 12 is an angular overall view of a printing apparatus and a printing tape cassette of the present invention, and

Fig. 13 is a plan view of a printing tape cassette of the present invention.

A first example of the present invention will be explained in detail using Fig. 1 through Fig. 8. Fig. 1 is a schematic diagram showing the overall construction of a printing apparatus of the present invention. 1 is a thermal type printing head (thermal head). Prescribed characters and symbols can be formed by pressing a thermal transfer ink ribbon 2 and ordinary paper (not illustrated) against a platen 8 and generating heat by means of the thermal head. In this thermal head, plural heat generation

elements (illustrated as 1a in Fig. 4) are arranged in rows as printing elements. 3 is a ribbon cassette containing ink ribbon 2, which is driven by an ink ribbon winding mechanism (not illustrated) mounted inside a carriage 4, and new ink ribbon is constantly supplied during the printing operation. Carriage 4 is installed so that it can be driven back and forth to the left and to the right (in the drawings, directions A and B) by a belt 5 engaged with a carriage transport motor 6 (hereafter abbreviated as carriage motor). 7a and 7b are guide shafts that support the carriage 4.

While a ribbon winding mechanism conventionally adopts the method of obtaining power from the carriage shifting, the present example adopts a structure where a motor dedicated to ribbon winding is mounted inside the carriage because there are cases where the carriage is stopped for printing.

11 is a paper feed roller for transporting printing paper, and a single sheet is transported while being held between it and supplemental roller 12. 9 is a paper feed motor that forms the power source for the paper transportation. A paper transport mechanism comprises paper feed roller 11, supplemental roller 12 and paper feed motor 9 as main elements.

13 is a projection on the carriage used to detect the carriage position, and together with a photosensor 14 forms a home position detection means.

The ribbon winding mechanism that drives the winding of the said ink ribbon in synchronization with the movement of the carriage is housed inside the carriage and includes a ribbon winding motor (not illustrated) as the power source.

Up to here the structure is basically identical to that of serial type printing apparatus in prior conventional use, and this print region 10 will be called the ordinary paper print region.

Adjacent to this ordinary paper print region 10 the present invention further provides a tape print region 20 for preparing a lettering tape.

21 is a printing tape cassette that contains a printing tape 22 and an adhesive tape 23, and is illustrated in Fig. 1 with its upper cover being removed.

Printing tape 22 of printing tape cassette 21 is a transparent tape in the present example, the adhesive tape covers the printing surface of the printing tape, and is a dual sided adhesive tape having adhesive portions on both sides so that it can adhere to an article. 15 is the printing opening of the printing tape cassette, and 16 is the discharge opening where the tape discharges as lettering tape 17. Printing opening 15 and discharge opening 16 are arranged at mutually opposite sides of the cassette, so that the transit length of the tape can be minimized and the arrangement of parts inside the cassette can be made with greatest efficiency.

27 is a cassette stand that mounts the printing tape cassette, underneath which a tape transport mechanism 30 is placed. Platen roller 31, compression roller 32 and compression supplemental roller 33 are engaged with tape transport mechanism 30, and they transport printing tape 22 and adhesive tape 23.

The fact that the tape print region is on a linear extension of the ordinary paper print region with a construction such that the position of the carriage can be easily shifted to the tape print region by the same carriage motor used for shifting the carriage inside the ordinary paper print region is a significant feature of the present invention.

Fig. 2 is a schematic drawing showing the construction of the printing tape transport mechanism, where the rotational movement is transmitted by gears 34, 35, 36 and 37 to drive platen roller 31 and compression roller 32, with tape transport motor 40 as the power source. Platen roller 31 rotates in the direction of arrow C, printing tape held by the pressure of the thermal head is discharged from the printing head portion, and the tape is transported toward the discharge opening under transportation force from compression roller 32. The compression supplemental roller 33 is placed on one end of a lever 38 so as to be rotatable, and is pushed in the direction of arrow E by a coil spring 39, the compression roller rotates in the direction of arrow D, and the printing tape and adhesive tape are pasted together to make lettering tape 17. 38a is a supporting point for lever 38. A release member 38b is formed at the end of lever 38 opposite to roller 33 so that release of the compression roller can be accomplished, in order that attachment and release of the printing tape cassette can be done easily.

The tape pressure adhesion mechanism is constructed with the said compression roller 32, supplemental roller 33, coil spring 39 and tape transport mechanism 30 as the main elements of construction.

Fig. 3 is a schematic plan view of a printing tape cassette, provided with tape guide rollers 24, 25 and 26 for guiding and stabilizing the transit of the tape inside the printing tape cassette. 45 is a lower frame of the cassette, and 41, 42 and 43 are projecting segments formed integrally with lower frame 45 in order to prevent intrusion of foreign objects. The printing tape cassette is made complete by joining an upper frame (not illustrated) as a cover.

Fig. 4 is a block diagram showing the overall construction of a word processor containing the drive control apparatus of the printing apparatus of

the present invention, where those things that are identical in Fig. 1 are shown by the same numbers and need not be explained here.

61 is a CPU that generally controls the word processor. A ROM 62 stores a control program, a ROM 63 stores a character font, a RAM 64 is for storage of transient data and a timer 66 for each type of time metering. An area 65 is of RAM 64 functions as a counter.

70 is the printing apparatus section of the word processor, where 71 is the head drive circuit that drives thermal head 1, 72 is a ribbon winding motor drive circuit that drives ribbon winding motor 69, 73 is a paper feed motor drive circuit that drives paper feed motor 9, 74 is a carriage motor drive circuit that drives carriage motor 6, 75 is a tape transport motor drive circuit that drives tape transport motor 40 and 76 is a light emitting and receiving circuit connected to photosensor 14.

The settings of ordinary paper print region 10 and tape print region 20 are done by selection on such as a keyboard. Conventionally a stepping motor is used as carriage motor 6. When the tape print region is selected, the carriage is moved while counting a prescribed number of steps in the direction of arrow B in Fig. 1 with the detection position of photosensor 14 as the home position (reference position), and it stops in the prescribed position. The counter area inside RAM 64 is used at this time. On the other hand, when the ordinary paper print region is selected, the prescribed printing is done while shifting the carriage back and forth inside this print region with the detection position of photosensor 14 as the home position. This is a carriage position setting means that thus selects the interval between the ordinary print region and the tape print region by shifting the position of the carriage by means of the carriage motor, whose main elements are counter area 65, carriage motor 6 and carriage motor drive circuit 74.

The operation inside the ordinary paper print region is the same as for conventional printers and so will not be explained.

The operation inside the tape print region will be explained in detail below. After the carriage has stopped in the prescribed position, it enters the printing operation, where the thermal head 1 is first pressed against platen roller 31. Since the compression mechanism of this sort of thermal head is a conventional one, an explanation will be omitted. The ribbon winding mechanism (not illustrated) that winds ink ribbon 2 and the printing tape transport mechanism are driven nearly simultaneously, driving of the thermal head is done in synchronization with this operation, and the prescribed characters and symbols are formed on printing tape 22. After printing, the printing tape is adhered to the dual sided adhesive tape by compression roller 32 and supplemental roller 33 to make lettering tape 17.

The manageability of the tape will be improved by providing a tape cutter for cutting the tape in the vicinity of discharge opening 16.

Fig. 8 is an explanatory diagram showing the operation of the carriage position setting and the position detection means, where the horizontal axis shows the carriage shifting distance. 300 shows the prescribed stop position of the carriage inside the tape print region. 301 shows the carriage motor position and speed (S). After starting from waiting position 305 based on the printing command and passing through acceleration region 306, the photosensor operates in the vicinity where the carriage reaches a constant velocity making this a region where printing is possible. 302 shows the detection waveform of the sensor. 303 is an example of the drive waveform of the printing head, in the region 307 where printing is possible, that is the ordinary paper print region, immediately after the reference position has been detected.

A portion or all of the acceleration region is set inside the tape print region to minimize the carriage shift distance and keep the lateral width of the printer mechanism down. When the carriage returns to the waiting position, after the detection operation of the photosensor, it is possible to stop at waiting position 105 by deceleration control. This control is carried out by the carriage position setting means.

Further, it is also possible to have the carriage waiting position during ordinary paper printing and the prescribed tape print position in one identical position.

Fig. 5, Fig. 6 and Fig. 7 are explanatory diagrams of printing with the tape print region of the printing apparatus of the present invention.

Fig. 5 is a schematic diagram showing the state of printing with thermal head 1, where printing tape 22 is transported in the direction of arrow G and the ink ribbon in the direction of arrow F at a nearly uniform speed. Conventionally it is necessary that the printing tape and ink ribbon shift are at the identical speed in order to prevent ink stains directly beneath the thermal head, and they are respectively controlled at their optimum speeds by a tape transport motor drive circuit as the main tape transport control means and by the ribbon winding motor as the main ribbon winding control means.

Further, conventionally a spring mechanism is provided on the winding side of the ink ribbon winding mechanism so that the ink ribbon will be wound on a winding core (not illustrated) without slackening. 81 shows characters formed by transfer from the ink ribbon. Characters 81 as illustrated are mirror image characters, and their method of printing differs from that of the ordinary paper print

region. However, the font data for such as the characters and symbols used in the ordinary paper print region can be utilized.

Fig. 6 is a schematic diagram showing the construction of the lettering tape and its process of formation, where 22 is the transparent tape for printing, and 55 shows ink transferred thereon. 23 is the adhesive tape, which is formed from adhesive layers 51 and 53, base film 52 between these adhesive layers and separator 54. Both tapes are compressed by the compression roller 32 and the compression supplemental roller 33 to prepare lettering tape 17.

The separator 54 can be easily peeled off the adhesive layer 53, and the lettering tape can be easily pasted onto various articles. Moreover, because the surface where the ink was transferred is covered by the printing tape itself, its reliability is high and there will be no erasure of the printed product when rubbed against.

Fig. 7 shows the state where the prepared lettering tape was cut, separator 54 was peeled off and it was attached to an article, namely a notebook 90. Because the surface of the printing tape is transparent, the printed mirror image characters appear as normal image characters after transfer.

Fig. 9, Fig. 10 and Fig. 11 are schematic diagrams of a second example of a printing apparatus according to the present invention, where things that are the same as in Example 1 have the same reference signs and are not explained again.

Fig. 9 is a schematic diagram showing the overall construction, where a gear 115 engaged with a ribbon winding motor mounted in carriage 4 is exposed outside of the carriage. 128 is a round platen placed opposite the printing head. The construction is such that carriage 4 is placed so as to be movable back and forth in the directions of arrow A and arrow B in the same manner as in the first example, and when it moves by a prescribed amount in the direction of arrow B, gear 115 and gear 131 engage.

The construction of the carriage interior will be discussed later, but the motion of the gears is transmitted by belts 132, 133 and 134 to platen roller 31 and compression roller 32, so it is possible to do tape printing in the same manner as in the first example. 136, 137 and 138 are pulleys. 135 is a support element that supports pulley 137 and gear 131 and pulley 138 formed integrally with this gear, in a freely rotatable manner. Support element 135 is supported on a printer frame (not illustrated) so as to rotate freely with shaft 135a as the center. 140 is a coil spring stretched between support element 135 and a pin 141 mounted on the frame, and 142 is a stopper. Tape transport mechanism 150 for transporting the printing tape is constructed with gear 131, belts 132, 133 and 134 and compression roller 32 as its main elements.

Fig 10(a) and (b) are plan views of the carriage interior, and Fig. 11 is an angular view. 119 is a heat radiation plate that supports thermal head 1 so as to rotate freely around a shaft 121 which is attached to carriage frame 120. As a ribbon winding motor a step motor 69 attached to the lower part of carriage frame 120 is used.

Motor gear 108 is attached to motor shaft 69a which passes through carriage frame 120. Solar gear 109 engages this motor gear. Solar gear 109 has satellite gear 111, and this satellite gear is supported on a support arm 110. The support arm is constructed so as to be rotatable around pin 110a furnished in the carriage frame. 112 and 113 are gears, and their satellite gear rotation transmits power to gear 114 engaged in core 124 of the ink ribbon winding. Gear 115 is further engaged with gear 113, being constructed so as to be capable of transmitting power outside the carriage.

Fig. 10(a) shows the state where an ink ribbon winding mechanism of a ribbon transit mechanism is operating.

When motor 69 rotates in the direction of arrow M1, solar gear 109 rotates in the direction of arrow N1. This rotation is transmitted to support arm 110, and satellite gear 111 engages with gear 112. Gear 113 then rotates in the direction of arrow P, core 124 rotates and after ink ribbon 2 of the ribbon cassette has passed thermal head 1, it is wound on a spool inside the ribbon cassette. Ribbon winding mechanism 200 is constructed of gears 112, 113 and 114 and core 124. Since gear 115 rotates together with the rotation of gear 113, it is a gear used to transmit drive force externally.

Fig. 10(b) shows the state where step motor 69 is engaged with the a head press/release mechanism that presses thermal head 1 against platen 128 and releases it.

103 is a cam of a rotation element, integrally formed with a cam gear 107, and it is formed so as to be capable of continuous rotational motion over 360 degrees with shaft 103d as the center. Spring support element 118 that is a cam follower is urged against the outer periphery of cam 103. In the present example, this cam has three cam positions of different radii extending to its outer periphery. The place of the smallest radius r1 is cam position 103a, that of the largest radius r3 is cam position 103c, and the place for the intermediate radius r2 is cam position 103b. A reflective portion 106 is placed on the upper surface of this cam, making it possible to detect the reference position of the rotation position with reflective type photosensor 105. The cam position detection means is constructed by this reflective portion 106 and photosensor 105. In the present example, the position where photosensor 105 detects reflective por-

tion 106 is selected so that radius r1 or cam position 103a is in contact with cam follower element 118.

A receiver 118a is formed integrally with spring support element 118. It is supported by a shaft 118b attached to the carriage frame and is constructed to be freely rotational. Compressed coil spring 102 as an elastic element is placed between heat radiation plate 119 of the thermal head and cam 103, and the thermal head exerts force from the back against platen 128 in the direction of arrow K1 depending on the cam position, making it possible to obtain a pressure force. When cam 103 is in contact with spring support element 118 at cam position 103a, thermal head 1 shifts in the direction of arrow K2 because of the force of release means tensile coil spring 116 and separates from platen 128, so that ink ribbon 2 and printing paper (not illustrated) can be inserted between the platen and the thermal head. Also, when cam position 103c is selected at time of printing, the compression force of thermal head 1 goes to maximum, and when 103b is selected the compression force becomes smaller. Head press/release mechanism 100 comprises cam 103, photosensor 105, spring support element 118 and compression coil spring 102 as its main elements, a motion direction switching mechanism comprises cam 103 and spring support element 118 as the principal elements, and a head pressure switching mechanism is constructed by adding the compression coil spring thereto.

The operation of the head press/release mechanism will be explained below.

When the step motor rotates in the direction of arrow M2, the solar gear 109 rotates in the direction of arrow N2, cam gear 107 and satellite gear 111 engage and cam 103 begins rotation in the direction of arrow L. The rotation position of cam 103 is detectable by the photosensor, the head release position is selected when the carriage shifts, and before the carriage shifting stops and printing begins, a cam position that gives a prescribed compressive force is selected so that thermal head 1 can press against the platen. This position control is easily possible by furnishing a control apparatus that controls the number of rotation steps of the step motor with the photosensor detection position as reference, and so need not be explained further. In thermal transfer printing it is conventionally known that print density and print quality are controlled by the pressure force exerted by the thermal head, and a high pressure force is good with bond paper of low surface smoothness while print quality improves further when the printing speed is slow in these cases. Also, high quality results are obtained with paper dedicated to thermal transfer printing even with little pressure, and there will be little damage to print quality even if the printing speed at this time is fast.

Thus the present example provides a construction allowing the pressure to be selected to correspond to the type of recording paper. Also, it is possible to use a drive control apparatus in this example that has the tape transport motor drive circuit of Fig. 4 removed. The printing operation will be explained below.

After the position of carriage 4 and the compression force of the head are selected, by running motor 69 in the backward direction, motor 69 engages with the ribbon winding mechanism, and while it drives with motor 69 and the carriage linked, the carriage is moved, the thermal head is driven and printing is done.

Carriage 4 shifts in the direction of arrow B, and thermal head 1 is shifted to a position opposite roller platen 31. At this position, gear 115 engages with gear 131 to give a state where printing is possible. Motor 69 is driven, thermal head 1 is pressed against roller platen 31, and then motor 69 is run in the backward direction, and printing is carried out while the ink ribbon inside ribbon cassette 3 and the tape inside the printing tape cassette 21 are advancing.

The second example has the advantage of being able to simplify the mechanism and the control because the motor used for ribbon winding needs to be driven only in the tape print region. Also, it is possible to prevent slippage in printing and deformation of characters because the advance of the printing tape and the advance of the ink ribbon are completely synchronized. Also, unlike printing paper of low smoothness such as bond paper, the printing tape has high smoothness and good printing effect is obtained by lowering the pressure exerted by the printing head during tape printing. In view of this the second example also has the advantage of obtaining the most suitable pressure force.

Although all of the printing apparatus of the present invention described above are explained as an example of a thermal transfer printer having heat generating elements, other printing methods like the current sensing heat type printing method using a head having electrodes in conjunction with an ink ribbon having a resistance layer can be employed.

Fig. 12 and Fig. 13 are schematic diagrams of a printing tape cassette of one example of the present invention and a printing apparatus using it. Fig. 12 shows an overall angular view of the printing tape cassette and printing apparatus, and Fig. 13 shows a plan view of the printing tape cassette. Things that are identical to what was previously explained are shown with the same numbers.

1 is a type of a thermal head as the printing

head, 3 is a ribbon cassette containing thermal transfer ink ribbon 2, and 21 is a printing tape cassette shown with the cover removed. 22 is a tape printing medium for reverse printing, being transparent tape wound around winding core 201 as an example. 23 is an adhesive tape having at lest one surface as an adhesive surface adhered to the reverse printing tape and covering the printed part. 202 is the winding core for this adhesive tape.

203 and 204 are guide rollers positioned inside the printing tape cassette for tape guiding, and 31 is a printing roller platen placed on the printing apparatus main member. Compression roller 32 and compression supplemental roller 33 are also provided in the main member.

Printing opening 15 and tape discharge opening 16 are present in the printing cassette as a minimum. The said two types of tapes are transported between the tape set-up positions on the rollers where they are wound on the winding cores, they are adhered together by the compression rollers, and they are discharged from tape discharge opening 16 as completed lettering tape 17.

Printing opening 15 and discharge opening 16 are arranged at mutually opposite sides of the cassette, which makes it possible to minimize the tape transport length, and makes it possible to arrange parts inside the cassette with the greatest efficiency.

230 is the printing apparatus main member, and contains such as a platen roller drive mechanism, a compression roller drive mechanism, a winding mechanism for such as an ink ribbon, as well as control circuits that drive these mechanisms and the thermal head. Power source line 232, data input terminal 231 and the like are also provided.

When printing tape cassette 21 is mounted, the thermal head is pressed against the roller platen via ink ribbon 2, and the required characters and symbols are printed on transparent tape 22. These characters and symbols are reversed from left to right as so called mirror image characters. When the printing is completed, the tape transits to the location of the compression rollers and is adhered to the adhesive tape to make lettering tape 17. This lettering tape has a printing surface protected by its own tape, so that even when it is adhered to various kinds of articles, it will be a tape of good durability with no loss of the printed characters from rubbing, giving it a very wide range of applications.

Also, even ink jet printers with improved inks can print on the transparent tape, and it will be possible to select various printing methods.

In the first example of the printing apparatus, the carriage position setting means was a means of specifying the position by using a counter area to control a stepping motor, but it is also possible to use a method of specifying the position based on position detection by increasing the number of photosensors. This method is particularly well suitable when using a DC motor as the carriage motor.

By following the present invention as described above, it will be possible to have a combination of two types of functions in a single printing apparatus, that is ordinary paper printing and lettering tape preparation, making it very useful and allowing anticipation of a wide range of applications.

Also, because of the fact that the control portion of the thermal head and such as the font data of the characters are used in common,it will be possible to achieve large cost reductions compared to the prior art, and it will be possible to expand the scope of application and layers of utilization in word processors.

Further, because of the fact that the ink ribbon cassette and the printing tape cassette are separated, the user will be able to combine printing tape colors and ink colors freely, and there is the advantage that with a single integral type cassette there will be no need to prepare many types of cassettes.

Also, because of the fact that the printing tape cassette of the present invention arranges the printing opening and the discharge opening on mutually opposite sides of the cassette, it can minimize the tape transit length inside the printing cassette and has the advantage of being able to arrange various types of parts effectively.

Claims

1. A printing apparatus for printing characters, symbols, etc. on a printing medium while shifting a carriage (4) mounting a printing head (1) having plural printing elements in either one of two opposite directions,

   characterized in that it has an ordinary paper print region (10) for printing on single sheets and a tape print region (20) for printing on a tape printing medium to prepare a lettering tape (17) and a carriage position setting means (6, 14, 61-68, 74, 76) for selecting the position of said carriage (4) depending on the print mode, wherein the tape print region (20) is provided adjacent to said ordinary paper print region (10) within the shifting range of the carriage (4).

2. The printing apparatus according to claim 1,

   characterized by control means controlling printing within said ordinary paper print region (10) by shifting the carriage (4) to the left and to the right and transporting the ordinary paper printing medium, and for controlling printing within said tape print region (20) by stopping

the shifting of the print head (1) and transporting the tape printing medium (22).

3. The printing apparatus according to claim 1 or 2

characterized in that the printing head (1) is a thermal transfer printing head that transfers the ink of a thermal ink ribbon onto the printing medium by applying heat.

4. The printing apparatus according to claim 3, characterized in that the printing head (1) has heat generating printing elements.

5. The printing apparatus according to any of the preceding claims, characterized by having a printing tape cassette mount (27) provided in said tape print region (20), said printing tape cassette mount being adapted to mount a printing tape cassette (21) which contains at least said tape printing medium (22).

6. The printing apparatus according to claim 5, characterized in that said printing tape cassette (21) includes said tape printing medium (22) together with an adhesive tape (23) and a tape pressure adhesion mechanism (32, 33) for adhering the tape printing medium to the adhesive tape.

7. The printing apparatus according to any of the preceding claims, comprising carriage position detection means (14) for detecting the position of the carriage (4), the carriage position detection means being provided at the boundary between the tape print region (20) and the ordinary paper print region (10).

8. The printing apparatus according to claim 7, characterized in that the tape print region (20) is used as an acceleration region for a carriage motor (6) when printing is done in said ordinary paper print region (10).

9. The printing apparatus according to claim 7, characterized in that it has a control means (61) for stopping the carriage (4) in a prescribed printing position inside said tape print region by means of the carriage position setting means, said control means taking the carriage position detection means (14) as a reference position.

10. A printing apparatus for printing characters, symbols, etc. on a printing medium while shifting a carriage (4) mounting a printing head (1) having plural printing elements in either one of two opposite directions,

characterized in that it has an ordinary paper print region (10) for printing on single sheets and a tape print region (20) for printing on a tape printing medium to prepare a lettering tape (17) and a carriage position setting means (6, 14, 61-68, 74, 76) for selecting the position of said carriage (4) depending on the print mode, said printing apparatus further having a ribbon winding mechanism (200) for winding an ink ribbon mounted on the carriage (4), a tape transport mechanism (150) provided in the tape print region (20) and means for connecting the tape transport mechanism and the ribbon winding mechanism within said tape print region for transmitting power to the tape transport mechanism.

11. The printing apparatus according to claim 10, where the power source of said ribbon winding mechanism (200) is a step motor.

12. The printing apparatus according to claim 10 or 11, comprising a head press/release mechanism (100) for pressing the thermal printing head against or releasing it from a platen (128), wherein the power source of the ribbon winding mechanism (200) and the power source of the head press/release mechanism (100) is a common power source operating said ribbon winding mechanism by rotating in one direction and said head press/release mechanism by rotating in another direction.

13. A printing apparatus for printing characters, symbols, etc. on a printing medium while shifting a carriage (4) mounting a thermal printing head (1) having plural heat generation elements in either one of two opposite directions,

characterized in that it has an ordinary paper print region (10) for printing on single sheets and a tape print region (20) for printing on a tape printing medium to prepare a lettering tape (17) and a carriage position setting means (6, 14, 61-68, 74, 76) for selecting the position of said carriage (4) depending on the print mode, said printing apparatus further having an ink ribbon winding mechanism (200) for winding a thermal transfer ink ribbon (2) mounted on the carriage (4), a tape transport mechanism (150) provided in the tape print region (20), and a head pressure switching mechanism (100) capable of switching the pressure force of the thermal printing head (1) against the print medium, said pressure switching mechanism being capable of applying a relatively low pressure in the tape print region and a relatively high pressure in the ordinary paper print region against the thermal

printing head (1).

14. A printing tape cassette, especially for use in a printing apparatus according to any of the preceding claims, housing a tape printing medium (22) and an adhesive tape (23) painted with an adhesive for covering the printed surface of the printing medium, said printing tape cassette having a printing opening (15) and a discharge opening (16) where the tape printing medium and the adhesive tape are adhered and discharged, the printing opening and the discharge opening being disposed on mutually opposite sides of said cassette.

15. The printing tape cassette according to claim 14, characterized in that the tape printing medium (22) is a transparent tape, and the adhesive tape (23) is covered with an adhesive on both sides.

16. A printing apparatus for printing characters, symbols, etc. on a printing medium, comprising a ribbon cassette (3) containing an ink ribbon (2), a printing tape cassette containing a tape printing medium (22) and an adhesive tape (23), a printing position where the ribbon cassette (3) and the printing tape cassette are mounted opposite to each other, and a printing head (1) for transferring ink from said ink ribbon (2) to said tape printing medium (22), said printing apparatus further having a ribbon winding mechanism (200), a tape transport mechanism (150) and means for joining the tape printing medium (22) to said adhesive tape (23) to form a lettering tape (17) which has the deposited ink sealed between the tape printing medium and the adhesive tape.

17. The printing apparatus according to claim 16, wherein the printing head is a thermal head and the ink ribbon is a thermal transfer type ink ribbon.

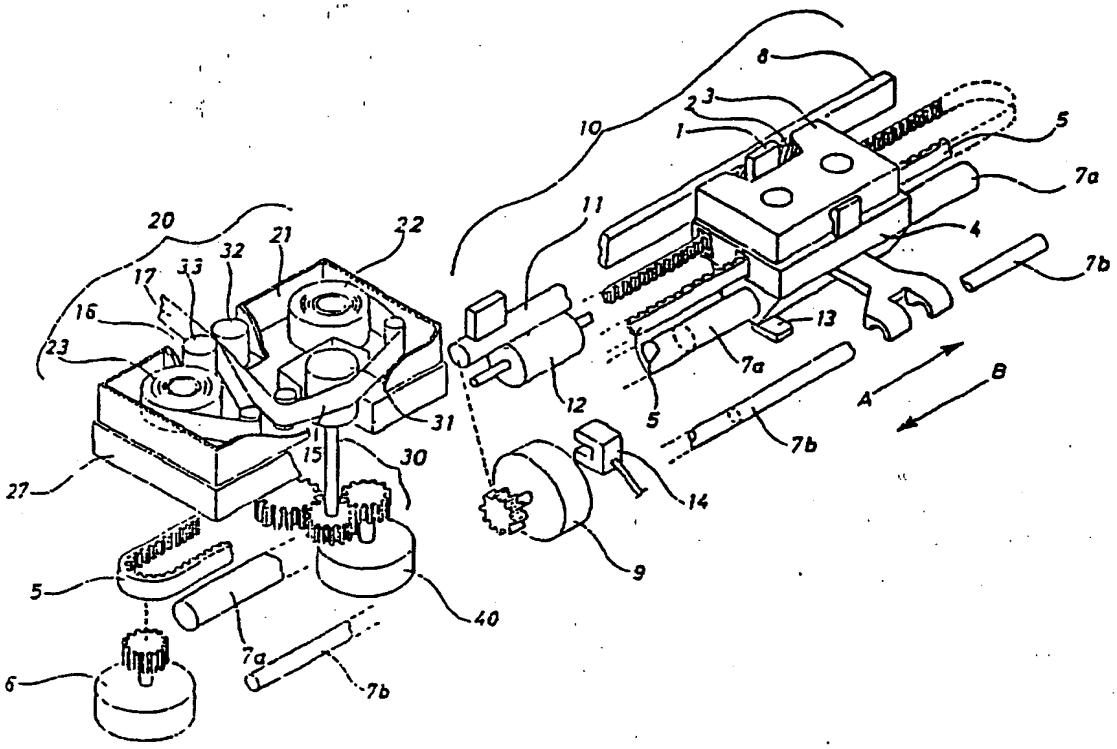
8
2
3
1
10
5
7a
11
4
7b
20
32
21
22
17
33
16
23
13
7a
A
B
12
5
7b
31
15
30
27
14
9
5
40
7a
6
7b

Fig. 1

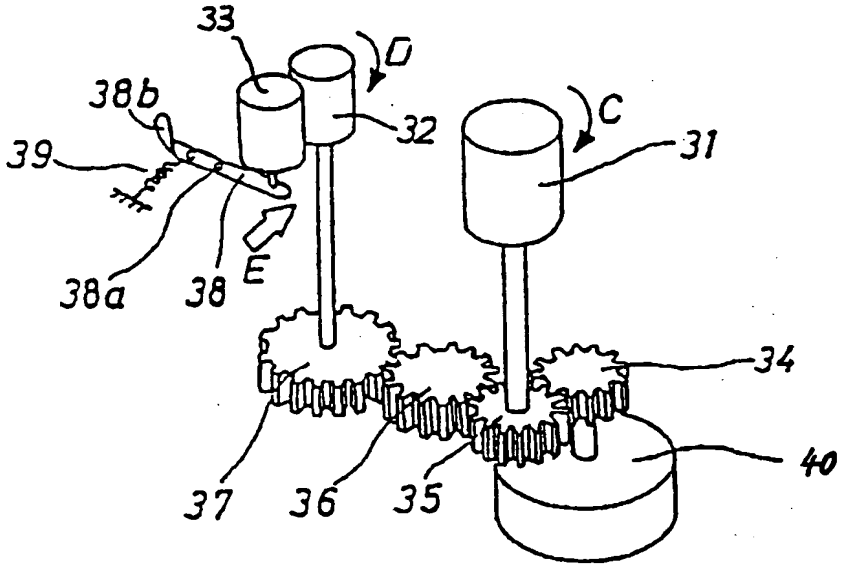

Fig. 2

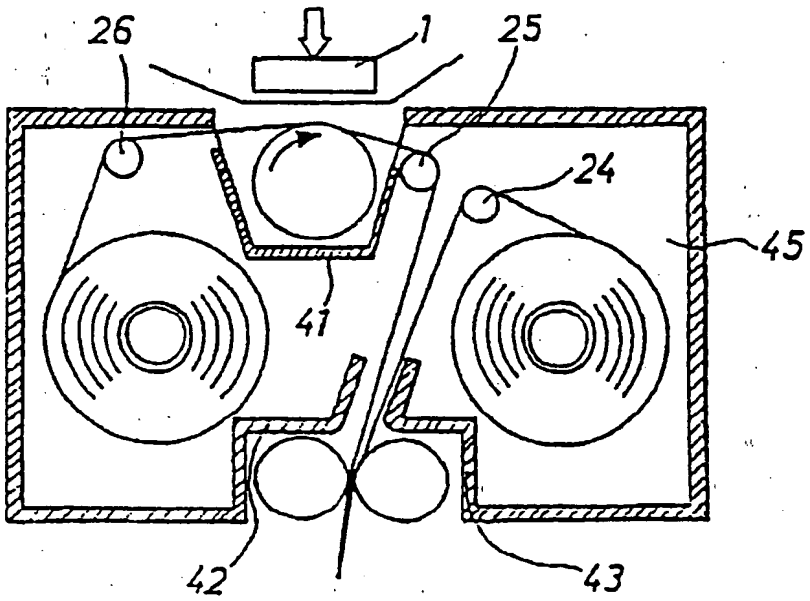

Fig. 3

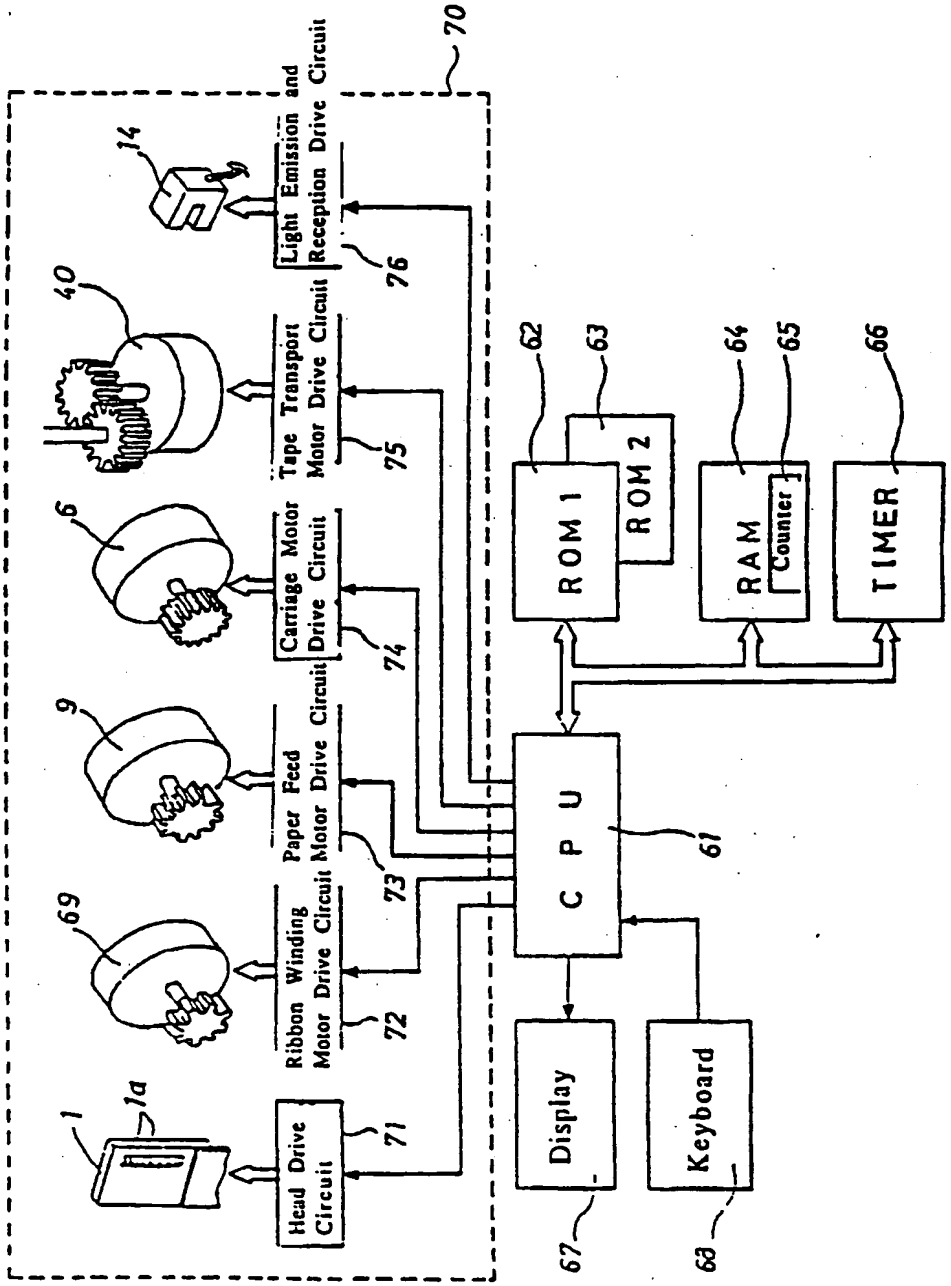
70
14
Light Emission and Reception Drive Circuit
76
40
Tape Transport Motor Drive Circuit
75
6
Carriage Motor Drive Circuit
74
9
Paper Feed Motor Drive Circuit
73
69
Ribbon Winding Motor Drive Circuit
72
1
1a
Head Drive Circuit
71
62
63
ROM 1
ROM 2
64
65
RAM
Counter
66
TIMER
C P U
61
Display
67
Keyboard
68

Fig. 4

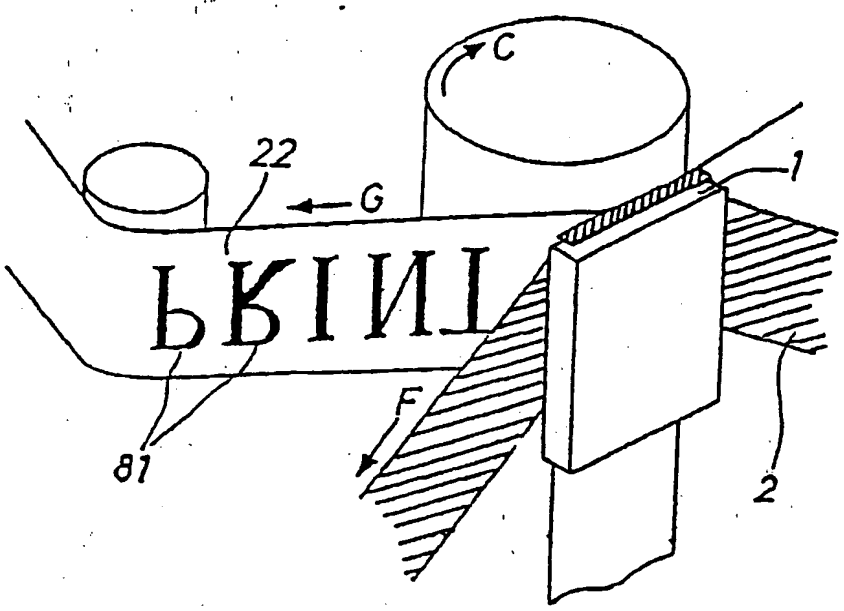

Fig. 5

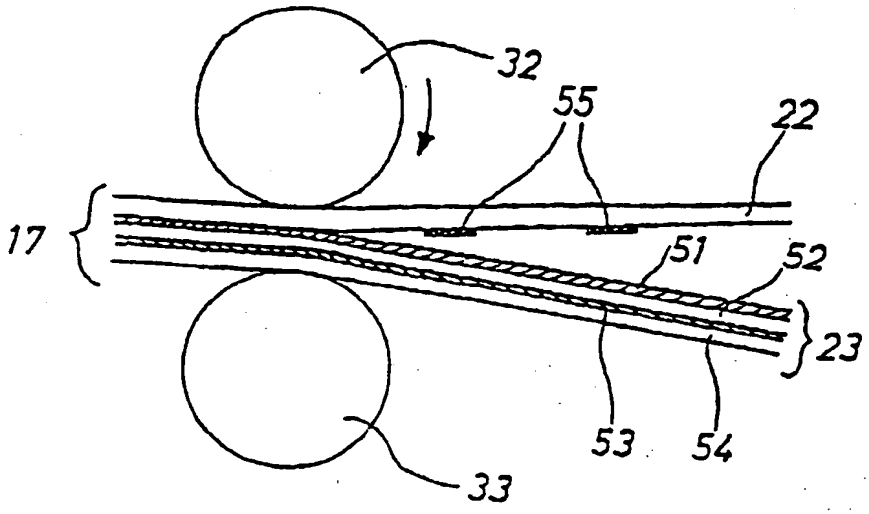

Fig. 6

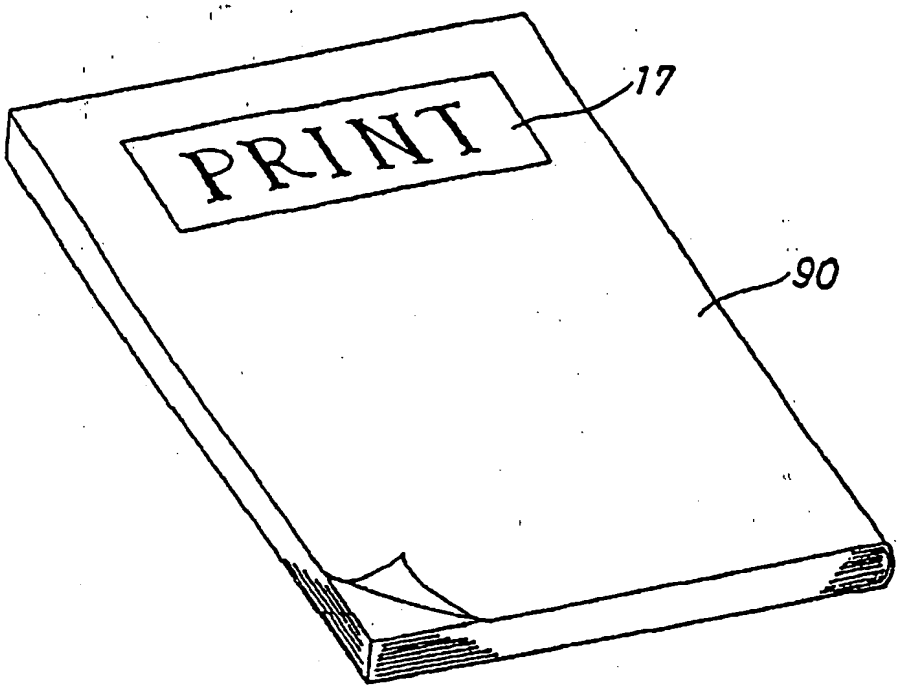

Fig. 7

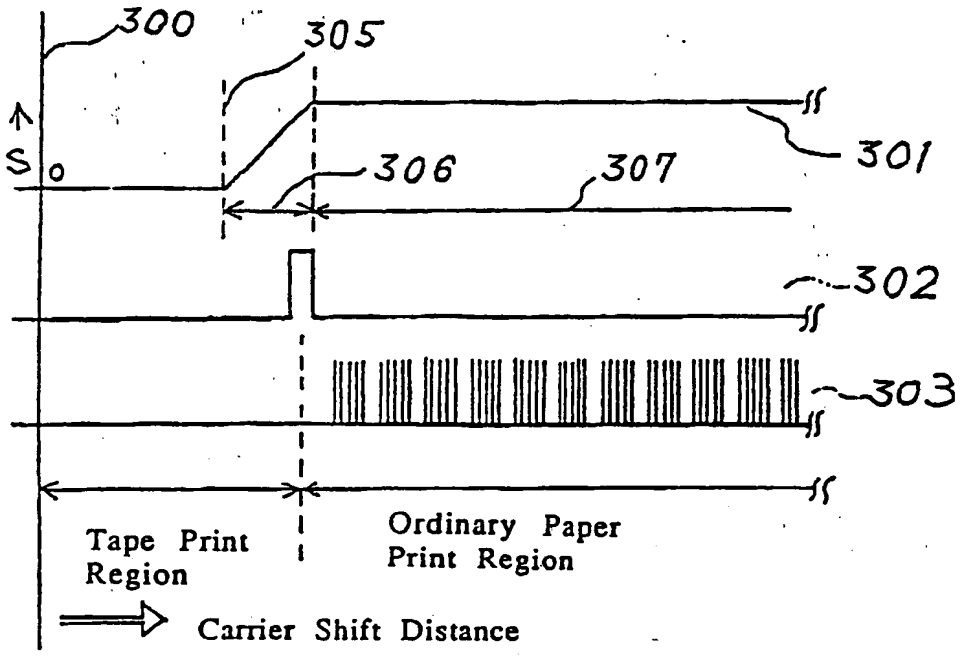
300
305
S
0
306
307
301
302
303
Tape Print Region
Ordinary Paper Print Region
Carrier Shift Distance

Fig. 8

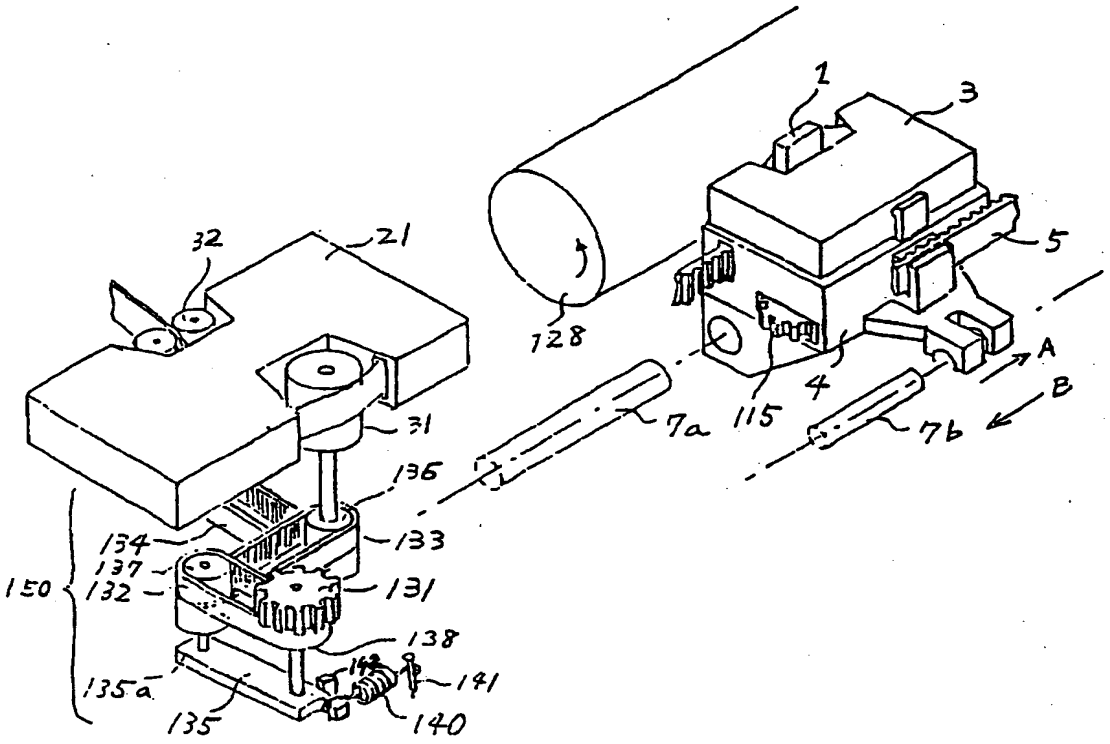
1
3
5
32
21
128
A
B
4
115
7a
7b
31
136
134
133
137
132
131
150
138
142
141
135a
135
140

Fig. 9

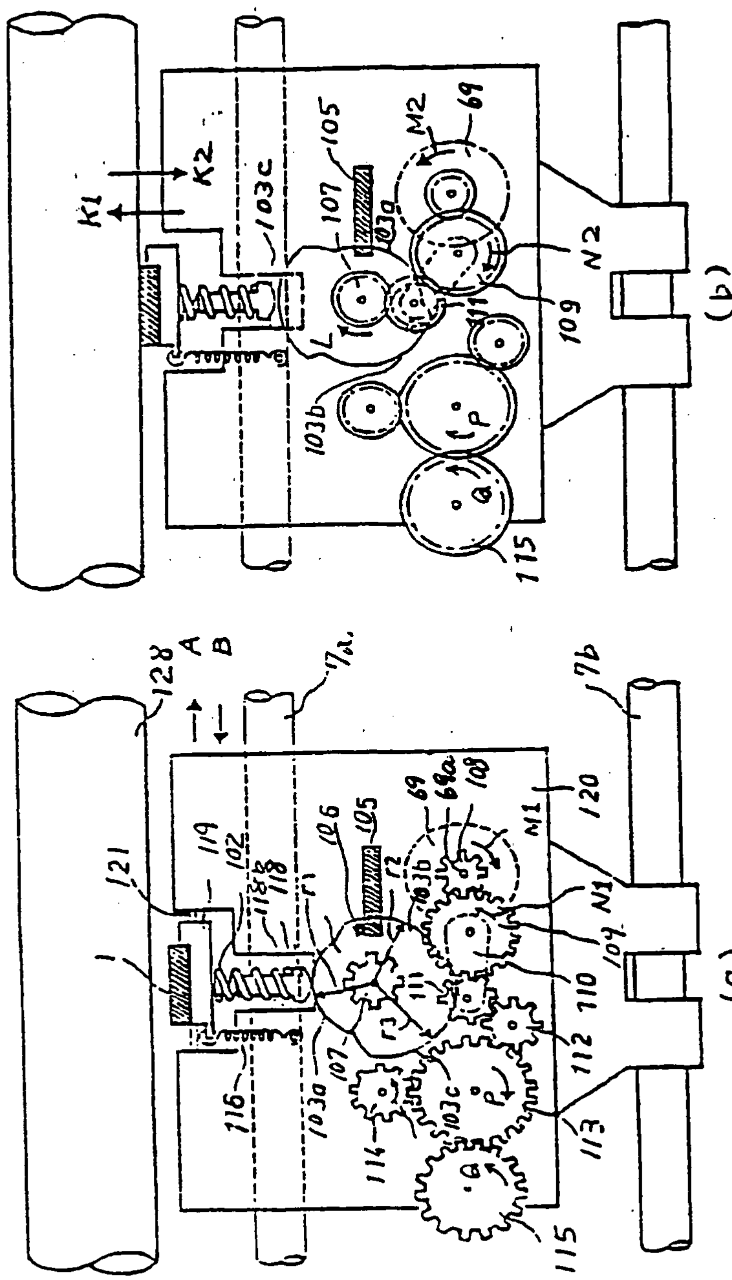
(a)
(b)
128
A
B
7a
7b
121
1
119
102
118b
118
116
103a
103b
103c
106
105
107
69
69a
108
N1
104
110
111
112
113
114
115
120
K1
K2
M2
N2
109
L
P
Q

Fig. 10

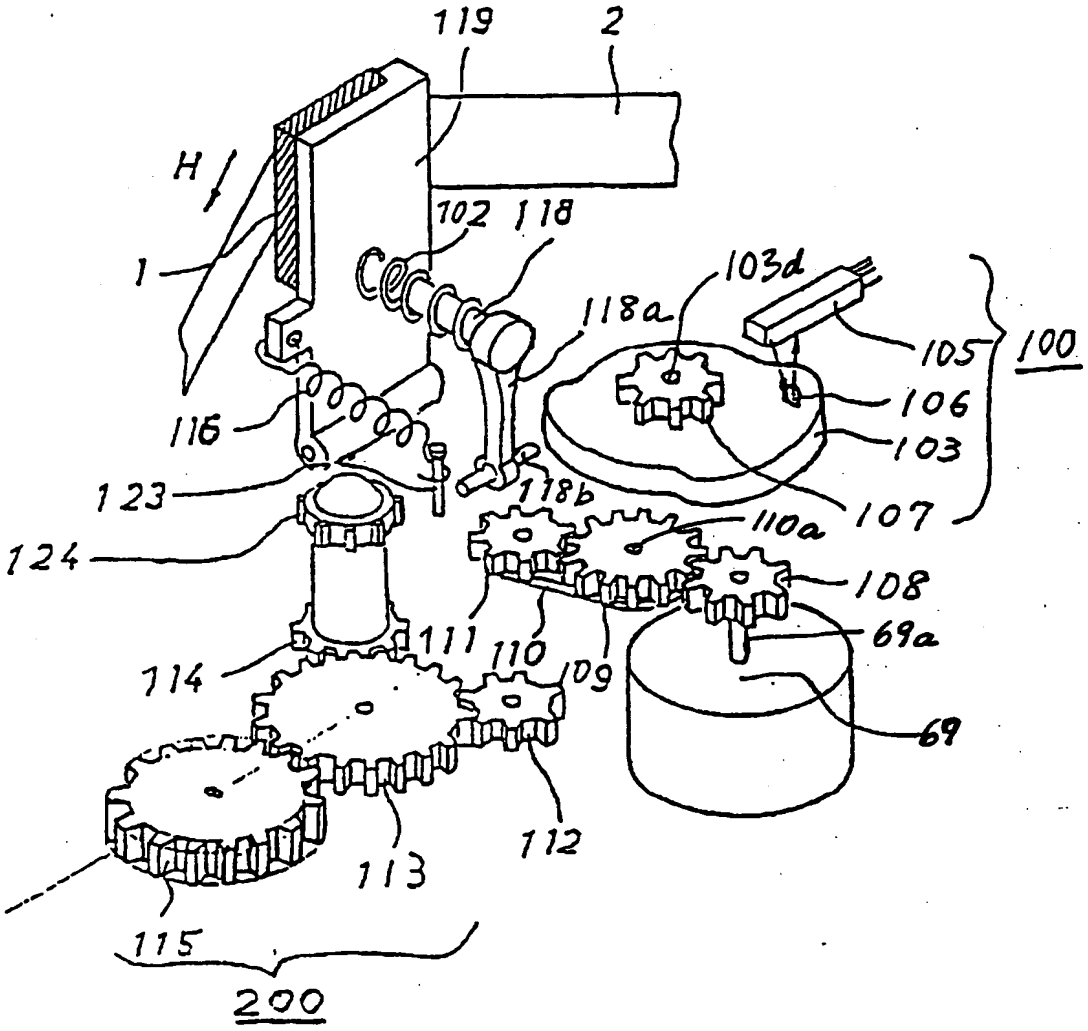
119
2
H
1
102
118
103d
118a
105
100
106
116
103
123
118b
107
110a
124
108
69a
111
110
109
114
69
112
113
115
200

Fig.11

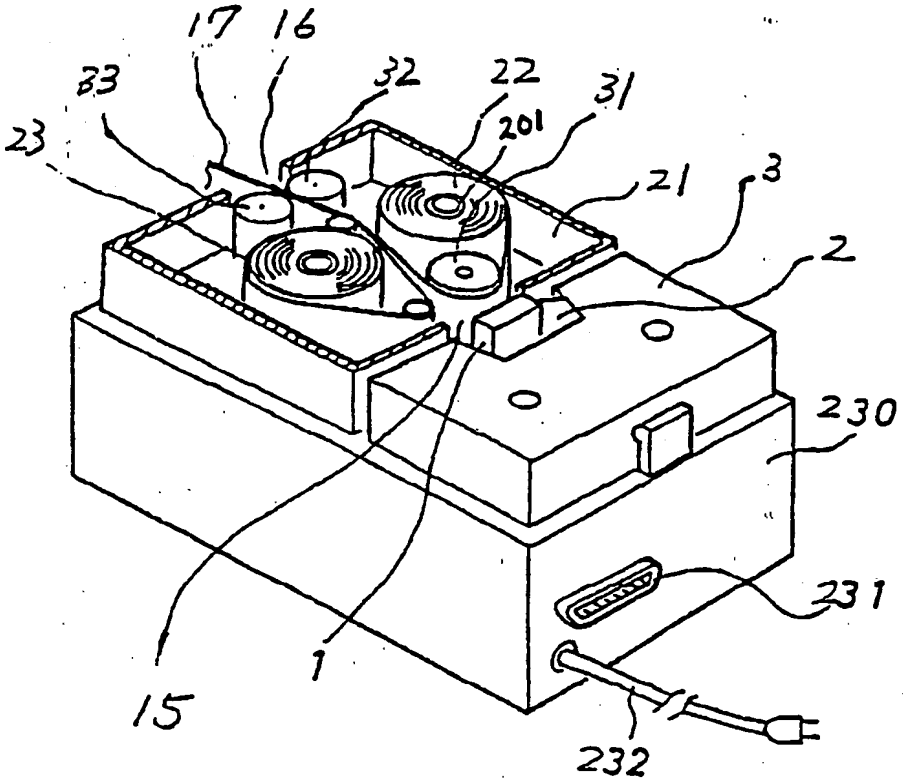

Fig. 12

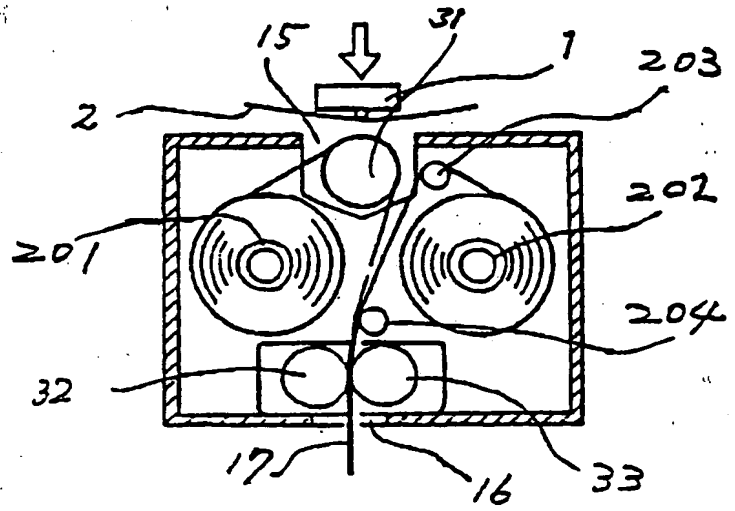

Fig. 13